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ABSTRACT

The role of social scientists and educators in the information revolution is to monitor the social, political, and economic consequences of increased use of technology and to research affective, cognitive, and social outcomes. Six issues provide a focus for addressing the impact of these changes. (1) An assessment of how the technological revolution will change education should consider creative uses of computers and avoid personal isolation and the "homogenization" of childhood. (2) Equal access regardless of economic status has been identified as the single most important issue of information technology in schools; currently, computers provide an information resource for upper and middle class homes and financially able school districts. (3) Research is required to ascertain how learning processes are affected as the new technology becomes integral to classroom instruction. (4) Objectives for redesigning content, materials, and strategies of social studies education need to be set in a theoretical context. (5) The extent to which students and teachers will be educated to use computers depends on a consistent definition of computer literacy. (6) Electronic learning can promote humanistic and democratic attitudes if programmed properly and used in an interactive manner. Such a review of the changing information technology will require work with business, research, and technical personnel while maintaining a critical and evaluative distance. (KC)

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THE NEW INFORMATION TECHNOLOGY: CRITICAL QUESTIONS FOR SOCIAL SCIENCE EDUCATORS

REVISED

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THE NEW INFORMATION TECHNOLOGY: CRITICAL QUESTIONS FOR SOCIAL SCIENCE EDUCATORS

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As social scientists and educators we cannot help but marvel at the metamorpnosis taking place in our work environment. We are in the midst of an information revolution. Microcomputers, which have become widely available in only the last 5-6 years, are now accessible as powerful and reliable tools for the computation and storage of vast amounts of data. Moreover, they are relatively portable and inexpensive. They make the huge mainframe computers of my graduate student research years look as outsized and cumbersome as the giant at the top of Jack's beanstalk.

Videodiscs, cable television and satellite telecommunications are also contributing to the information revolution as it unfolds all around us. Videodiscs, for example, have nearly an unlimited capacity for information storage and reproduction. A single videodisc can contain over 100,000 frames of visuals, and that disc can be reproduced by stamping a copy disc in a fraction of a second. These remarkable advances are changing every facet of our lives including work, recreation, and education.

Change is taking place so rapidly in this electronic revolution, and educators have been inundated with so many questions concerning practical matters of adaptation, that it has been difficult to discern the larger issues for our profession. Much of the response among social studies professionals thus far has been addressed to "how to do it" (e.g., Diem, 1981; Cohen,

1983; Martorella, 1983). Of course, we do need to learn about the techniques of new informa-tion technology. We must obtain basic descriptions and learn practical applications. However, it is more important to us as social science educators that we reflect on the nature of the changes taking place and attempt to grasp the implications for individual and collective perceptions of reality. Will the new technology change substantially the way people view the world and each other?

The larger social and professional issues do not emerge readily from the general literature on the new technology. The articles, reports, viewpoints, and early research reviewed by this novice suggest that the lack of high resolution regarding the big issues may be attributable to the fact that there are three planes of interest which cross each other only now and then.

One is a utilitarian approach to the technology, i.e., what it is, how it works, how to use it. The second is what Europeans refer to as "informatics," which is a more specific applied approach to the technology, i.e., examination of how the technology can be related to specific subject matter. The third, which thus far has very limited development in the social studies literature, is a kind of participant-observer examination and analysis of new tech lifestyles in schools and elsewhere in the society, i.e., assessments of what computers and telecommunications are doing for us and to us, and how individuals and groups are responding.

It seems to me that all three types of investigation have something to offer us as we set out to reassess purposes and

means in the profession and attempt to chart directions for the future. Therefore, I will attempt to draw upon these several levels of discussion in raising critical questions to be addressed by social science/social studies educators.

1. How is the revolution in information technology changing the schools and education, especially social studies education?

Education generally deals in information and information skills. The school traditionally has been the center for a wealth of information sources which were unavailable in the home. Libraries, laboratories, displays, films, maps, and quantities of textbooks made the school a special place for information. But that is rapidly changing. The newer informa-tion sources have first become available outside of the schools. Television, utilized only minimally in schools, provides an information source in every home which has gradually shifted the balance. Microcomputers, in use in businesses and in home recreation years before extensive use in the schools, have tipped the balance. Schools are no longer the centers of information.

Perceptions of schools and education are changing. Children now have direct sources of information in television sets and microcomputers; they are not so dependent on the teacher. Parental and public confidence in schools is declining. The recent report of the National Commission on Excellence in Education (U.S. Department of Education, 1983) registers a public outcry against declining school achievement scores. The average school graduate of today is reportedly not as well-educated as the average graduate of 24 or even 35 years ago! It is

interesting that action called for is not to junk the schools as educational institutions but rather to raise "standards" and reform teaching approaches. Computer applications stands out among the recommended reforms.

In these technological reform efforts social studies educators can help to meet several student needs. One is in the area of "training"--training youngsters in the skills needed to organize, utilize, and evaluate the great wealth of information available to them. The technology, if used creatively, can provide an effective means to move away from narrow facts-memorization teaching. Another need is to avert personal isolation from electronic education by providing opportunities to practice group decisions and examine group values. Still another challenge for social studies educators is in the need for counter-balancing the simplistic or stereotyped realities conveyed on television and in electronic games which tend to "homogenize" childhood (Johnson, 1981).

So what is new in these challenges? Haven't these been among the objectives of social studies education for many years? We should not be misled by their familiar ring because the situation in school and universities is changing. The communications style of education is being imposed from without not within. The technological advances which are now engulfing all levels of education are rapidly changing the ways in which we do research, the ways in which we design and teach our courses, and the ways in which we must serve social studies education in the schools. The electronic revolution, therefore, is raising a whole raft of practical where-to-use-it and how-to-do-it

questions for social studies educators. To enrich and update the curriculum and to invigorate and revise methods of instruction today we must work with programmers, business firms, technicians, and systems developers.

As we assess our professional obligations, however, we must not overlook the larger significance of the electronic revolution to us as social studies educators. Technological change is creating social, economic, and political issues while it is making history. In short, the content of social science and history, the subject matter of the social studies, is being amended and extended. Just a few examples: Employment patterns are changing with declines in heavy manufacturing and agriculture and increases in information occupations; Institutional power hierarchies are shifting as exemplified by the rise of systems analysts in business and higher education; The huge world markets for electronic equipment have become highly competitive and fragmented, and related international hostilities have developed; Needs for governmental protection and regulation of rights related to issues of personal privacy and software ethics are arising.

2. <u>How great are the inequities created by initial distribution patterns and how can equal access be promoted</u>?

In the U.S. the older information technology, namely radio and one-way television, obtained wide distribution across social and economic lines. What about the new technology? In the area of interactive satellite telecommunications the question of costs still looms large. Naisbitt, in his book <u>Megatrends</u> (1981), for

example, dismisses interactive satellite technology as too costly for mass application and mass availability in the near future. Computers, thus far, are providing an information resource mainly for upper and middle class homes and well-heeled school districts without budget problems. In fact, participants at a 1982 conference sponsored by the National Institute of Education identified "equal access regardless of economic status" as the single most important issue of information technology in schools (Deck, 1982).

Declining costs in computer production and the rising priority given to computers in school budgets suggest that availability will increase rapidly in the near future. We should keep in mind, however, that effective use of newer information sources requires an active rather than a passive user. Unlike television and radio as we now use them by pushing a button and sitting back to passively observe and listen, the more recent technology requires responses and some skills on the part of the user. Accessibility, therefore, is based not only on hardware distribution but on knowledge and training for effective use.

Interlinkage of computers to television and to satellites has brought about a communications revolution of international dimensions and raised issues of accessibility on an international scope. Equal access is emerging as one of the major political and social questions of international governance. Article 19 of the Declaration of Human Rights adopted by the United Nations states that everyone has the right to seek, receive, and send information and ideas through all types of media. In recent years in the U.N., developing countries have expressed resentment

at the manner in which they have been flooded with news and advertising from the larger industrialized nations. They seek an equal capacity to disseminate information (Powers, 1980).

Overall, given the interest in the accessibility of hardware and skills it seems likely that in the next few years the schools will be called upon to examine existing inequities and assist in reducing them by providing equal opportunities for learning the skills and applications of innovative technology. This is not a new obligation for schools and educators in democratic countries, but it is not an easy one to fulfill. As social educators in a democracy we must be concerned about open access to knowledge resources. How we approach the question of equal access will require important decisions in national and local political arenas and in the profession soon.

3. <u>As the new technology becomes integral to instruction in the classroom, how are student learning processes affected</u>?

School learning is shifting from an overwhelming dependence on learning from print resources to more and more use of electronic resources. Video screens have brought about some change in learning processes in the last few decades, but his was mostly outside of schools. Today microcomputers and videodiscs promise highly accelerated change in the ways in which students learn both in schools and out.

Educational psychologist Mary Alice White (1982) has done some pioneering work in the analysis of electronic learning which can be enlightening to us in social studies education. She has defined three stages of electronic learning: 1) the television

stage which began in the 1940s, 2) the computer stage which we have recently entered, and 3) the stage of "the complete electronic learning center" which she predicts is "just around the corner."

White decries the missed opportunities by psychologists during the television stage. Making assumptions that the only learning worthwhile was print based, psychologists dismissed television as a frivolous waste of time and failed to study throughout the first electronic stage exactly what was being learned and how. She goes on to review basic assumptions of three widely accepted learning theories--reinforcement, developmental, and information-processing theories--and points out that they do not hold up when applied to electronic learning. The research on which these learning theories are founded is based on print learning situations.

White proposes that a theory of electronic learning is needed, and a whole new body of research conducted. Motivation, memory, attention, control, and interaction must be studied anew in the new electronic learning environment. As a beginning point she urges careful comparative studies of electronic and print learning. Then, as a first step she provides an interesting comparison of some characteristics of print learning with two types of electronic learning--<u>receptive</u> learning (television, cable) and <u>interactive</u> learning (computer, video-disc, interactive cable).

The differences between receptive and interactive electronic learning seem to me to be most significant for social studies education (See Hepburn, 1978). The interactive modes offer high

motivation and attention along with high user control, opportunities to ask questions and respond to questions in decision and gaming formats, and greater relative potential for high image communication. The content of social studies is dynamic, continually expanding and changing, and it is people centered. Clearly, content which involves people, issues, and decisions is best taught in an interactive mode. New information technology has the potential to stimulate and increase social studies learning not only by providing freer access to information but also through learning activities which require frequent active utilization of content. The proposition begs for research.

4. In what theoretical context(s) shall we set objectives for redesigning content, materials, and strategies of social studies education as we proceed into the information revolution?

Belief and actions regarding social studies depend not only on learning theory but on social and educational philosophies, and the two are not often easily reconciled (See Hunt and Metcalf, 1968). Today we are subjected to a loud clamor from the public arena in which so many education decisions are made. It resounds with calls for action--from government, from business and industry, from academic, from local communities. All demand improved school education in the new technological era. But the voices are not united. The various formulas for improvement reveal differing philosophical perspectives.

Before leaping into "high tech," social scientists and social studies educators should reflect on underlying purposes and implied outcomes. For example, high in the arena a group we

might call "modern day essentialists" are demanding that we meet the needs of the new era by strengthening education in the basic traditional subjects. The call is for more rigor in school education to produce greater intellectual skills as evidenced in higher test scores. New information technology is to be used to produce a more efficient knowledge-of-the-basics education. Using the technology, teachers are to demonstrate the means to specific knowledge and thus enrich student retention and access to important factual information. In this view the significance of the technology is that we can use it to better learn and better communicate the observed and measured reality in which we live (e.g., Scandura, 1982).

From another part of the arena come the cheers of another group whom we might call "modern day progressives." They welcome technological development with differing expectations. They call for a reinvigoration of the problem-solving approach to education with electronic information tools (e.g., Ray, 1982). They envisage the new technology as a means for teachers to improve the conditions for student learning of processes. They forsee that in the future classroom the teacher's role as guide or aide will be enhanced, and the temptation for the teacher to act as a conduit of knowledge will be minimized ~~(e.g., Ray, 1982).~~ In this view the significance of technology is that it provides a more efficient means to test hypotheses and to examine unchallenged truths.

Of course, there are other perspectives. Some view the information revolution as possible means to social reconstruction. Others foresee a fearful technocracy. A few are calling

for new social theories to reconcile changing interests in both materialistic and humanistic advancement (See Hartoonian, 1983).

The unprecedented rapid rate of technological change makes careful reflection difficult. Nevertheless, social studies educators must take time to examine the assumptions and implications of proposed development programs. We must attempt to define the theoretical contexts of the choices we are making as we decide individually and in large professional groups just how we shall respond to the new technology in our environment.

5. How shall we define social studies "computer literacy" and thus the extent to which we will attempt to educate students and teachers to utilize computers in the social studies?

The term "computer literacy" applied to students or teachers is controversial. It is widely used by educators to refer to some minimum level of competency of learning about computer applications, but there is little agreement about what the minimum should be. One group of educators uses the term to refer to competency in recognizing and describing the capabilities of computers, their impact on society, and some practical information about their application in work areas. A group of Swedish educators, for example, has experimented with teaching "computer appreciation" in mathematics and civics courses in upper secondary school. Students develop an awareness of the use of computers in workplaces by reading, discussion, and field trips, and by using the computer to solve math problems (Kollerbauer, 1982).

Other educators argue that "computer literacy" means the ability to actually do computing including programming skills (Kelman, 1982; Calhoun, 1981). Some have suggested that computer software be used to teach about the nature of computers, and their role in economic and social change. For teachers, instructor-created software could be used to review the effects of computers on the curriculum (Hofmeister, 1982).

Another view is that school computing experience should be provided only for those who are interested, rather than forcing it on every student (or every teacher). It is argued that the demand for universal computer literacy has been based on a false impression of computer education as a means to a good job and social mobility (Harvey, 1983). Given the limited number of computers in each classroom, it is argued, those who are interested and who are progressing should have greater access.

The question of how much social studies teachers and social studies students must know about computers and how skilled they must be in the use of computers is a serious issue in our subject area. Social studies teachers are reported to be "at the bottom of every usage survey," and, even those few who utilize computers in social studies instruction, use it mainly for drill and practice or canned simulations rather than teaching social science processes (Roberts, 1982).

We can gain some insight into the usage problem from Western European educators who gathered at a conference in Italy last fall to report and discuss their experiences with computer applications in education (Council for Cultural Cooperation, 1982). All of the reports emphasized the initial need to alleviate

teacher fears of the computer. Commentary in U.S. computer journals and in some European reports suggests that once teachers have enough training to feel familiar with the hardware, and are given enough time to experiment, they, like their students, will be caught up in the activeness, challenge, and versatility of the medium (Ray, 1982; Olds, 1983).

We have learned from past innovations in social studies curriculum that the confidence and cooperation of teachers is required for successful application with students. "New social studies" materials and more recently citizenship education strategies presented teachers with curriculum materials which were mainly in the age-old non-threatening print medium. You may ask if success was limited then, how can we expect to be successful in social studies education which utilizes a wholly new microelectronic medium?

One response is that we are just finding the appropriate medium for some of the older messages of the social studies curriculum. The more open, interactive, information-fed format of learning, using computers, can help to promote inquiry and problem solving, Debugging can provide some powerful lessons in both logical and critical thinking. Programming requires conceptualizing and a series of hypothesis testing activities. Moreover, today there is a less hostile environment for discovery learning in the technological mode. The social and economic climate tends to encourage learning to do computing and about computing and its effects. The current political climate is also supportive.

6. How will the revolution in information technology affect human interaction in schools and classroom?

Educators from 12 European nations at the computer technology workshop last fall discussed several concerns about the human effects of computerization in schools (Council for Cultural Cooperation, 1982). One of these was teacher fear of replacement by technology. Another was the threat of replacing teachers with technically trained persons from the business world. Participants determined that teacher replacement was far-fetched. And, although the hiring of teachers with business world experience with computers was encouraged for some vocational programs, proposals and recommendations were built around the assumption that subject area teachers will learn enough about computing through in-service or basic teacher education courses to be able to use the technology as a teaching tool in their subject area. Two important changes in the teacher's role were predicted however: teachers will no longer be the prime source of information, and teachers will develop new skills and will become more professional.

Not too many years ago American teachers could be heard to express concerns about being replaced by computers. Some had conjured up images of a clanking metal robot with flashing lights teaching World History in a droning electronic voice. Now, computers are much less threatening in the U.S. because they are everywhere visible outside the school--in the grocery store checkout, the appliance section of department stores, post offices, travel agencies, brokerage firms, airline ticket counters, nursing stations in hospitals, and in the living rooms

and offices of favorite soap opera characters. Increasingly teachers can be heard expressing impatience at not having a computer exclusively for their own classroom.

One of the human problems about which American sociologists and psychologists have expressed concern is the impersonality of computers. Computers will not adjust to us as people do. They adhere to a specific program. A typical example is the kind of irritation one feels after five years of paying the light bill on time. Then on return from a vacation, a short unpleasant letter is found threatening to turn off the power because the payment is three days late. The telltale dot-matrix print in the letter reveals that it was prepared by a computer. But how do you explain your situation to an impersonal, inflexible, and cold computer?

On the other hand, in some situations computers have been found to be more "humane" by reducing embarrassment and puting people more at ease than if they were with a human. Patients in hospitals preferred computer interviews, and alcoholics more honestly reported more alcohol consumption to computers than to sympathetic human interviewers (Calhoun, 1981). Computers do not give us a glance of disapproval or a condescending response--unless programmed to do so. Certain school children may be better motivated to learn in com-puterized trial-and-error learning situations in which they feel free to make errors without receiving disapproving glances or remarks from teacher and classmates.

Will we lose the opportunities for cooperative learning and group discussion afforded by traditional print-oriented classrooms? White (1982) reported a study conducted at Teachers College in which pupils interacted with each other more in the computer room than in the regular classroom. Moreover, much of the interaction in the computer room was concerned with learning, while in the print-oriented classroom much less of the interaction was productive.

Telecommunications can add another dimension of human sharing to the microcomputer and video screens. Telecommunications make interaction possible between student groups across many miles, across continents. They may exchange facts, but they may also exchange feelings.

It seems to me that individualized electronic access to information is likely to have significant effects on the age-old authority structure in the classroom freeing teachers as well as students. As pointed out earlier, teachers will no longer be considered "fountains of knowledge," but teachers will be provided with electronic tools which allow them to more effectively teach the skills of logic, clear expression, critical thinking, and more democratic intergroup communication. A side effect is that teachers are likely to improve their own professional status.

Students will have greater direct information access and be less subject to unproductive teacher manipulation. The psychological relationships between teachers and students seem likely to change as they interact with electronic data sources in a common purpose.

The potential for a more democratic and more productive classroom atmosphere is there.

Overall, there is every indication that electronic learning need not be dehumanizing and can, in fact, promote humanistic and democratic attitudes if programmed properly and used in an open and interactive manner.

Conclusions

In the rush to bring social studies education up to date by bringing the marvels of new electronic information technology to the social studies, we must not lost sight of the overall social context of the changes taking place. As social scientists and historians we must attempt to monitor the social, political, and economic consequences of increased use of the technology in schools and everywhere else. As educators we must examine various possible uses and carefully research the affective, cognitive, and social outcomes.

Technological advancement is a result of human creativity, and it is human factors which will determine use and direction. Social science educators have not been in the forefront of educational development in the electronic revolution. If we do not become knowledgeable and get involved, the directions of development will be determined outside of the profession.

Our commitment in the Social Science Education Consortium and other professional social studies organizations is to raise questions and systematically seek answers. Such a review of the changing information technology will require learning its techniques cooperating with experienced business, research and tech-

nical personnel to develop our skills of application. At the same time we must keep a critical and evaluative distance in an effort to assure that the quality of the programs developed and the results that are produced are appropriate to the goals of social science education.

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